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ARSON MYTHS FUEL ERRORS

Debunked theories plague fire probes, lead to wrongful arrests, prosecutions

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The prosecution of Beverly Jean Long for the 2003 murder of her husband in rural Georgia reveals a tale of two mistakes. One killed her husband, James. The other put her on trial for murder by arson.

It is a story of authorities who relied on outdated and disproven theories to wrongly classify an accidental fire as arson.

And it unfolded at a time when veteran arson investigators are questioning the ability of some colleagues to accurately determine the cause and origin of fires.

For decades, arson investigators relied on a collection of beliefs and folk wisdom that was accepted as truth. In the last 30 years, however, many of these one-time certainties have been exposed by research and laboratory tests as unclear or just plain wrong.

The problems plaguing arson investigations over the years--untested theories, shoddy analysis and a resistance to rigorous review--echo those found in other areas of forensics. When experts overstate their findings or rely on outdated thinking, the pursuit of truth in the courtroom is subverted. In fire investigations, mistakes can lead to the belief that there is a crime when none was committed.

In 2002, arson was blamed for 350 deaths nationwide and the destruction of an estimated 45,000 structures. More than 16,000 people were charged with the crime.

While engineers, chemists and other experts increasingly are employed to determine the cause of fires, some arson investigators have not accepted new scientific knowledge.

As a result, prosecutors around the country still seek to convict people based on theories that have been systematically debunked. At the same time, defense lawyers are reaching out to private fire consultants to conduct independent analyses.

Gerald Hurst, a consultant based in Austin, Texas, has analyzed numerous fires and

ruled out arson to help free several defendants. The most recent was Texas Death Row inmate Ernest Willis, who walked out of prison this month after Hurst's analysis found "not a single item of evidence" that a 1986 fire Willis was convicted of setting was arson.

Hurst, who has a PhD in chemistry from Cambridge University in England, estimates that thousands of fires have been misinterpreted in the last 50 years because of reliance on myths. "God knows how many innocent people have been convicted," he said.

And the mislabeling of accidental fires as arson by authorities relying on disproven theories continues, Hurst said. "You've got tons of holdouts--good old boys who've investigated 5,000 fires and they are doing it the same way they've always done it."

By the time Beverly Jean Long made a frantic 911 call for help, she was standing outside her house watching flames and billowing smoke shoot through the roof of the converted airplane hangar that was her husband's workshop.

Inside were propane tanks and barrels of diesel and jet fuel, as well as containers of gasoline for the many chain saws he used in his tree-trimming business.

So was her husband.

The night of Jan. 23, 2003, was the coldest night of that winter, with the temperature dropping below freezing. Long would later say she was watching as her husband, James, 53, tried to thaw out their frozen water pipes and refueled a heater--known as a smudge pot--with gasoline instead of kerosene. When the gasoline vapors ignited, his clothing was set ablaze.

"He was engulfed in flames," Long later said.

Her husband dropped to the floor and rolled, she said, and she tried to pull off his coat, but the tips of her gloves caught fire. Neither effort extinguished the flames. Long said she then ran out of the shop and into their house to grab her cell phone and make the 911 call.

"What's going on, ma'am?" the operator asked.

"Fire! My husband's burned to death!" Long shouted.

After some confusion about her location, Long shouted at the operator again, her voice twisting into an almost incoherent, hysterical moan. "Please hurry. ... Oh, dear God, please help me! I told him not to put that in there!"

"How did the fire start?" the operator asked.

"He was trying to thaw out the pipes and I told him not to do it and he wouldn't listen to me," Long said.

The operator urged Long to calm down.

"I can't calm down!" she shouted. "I lost my husband. He's burning to death. Oh, dear God!"

When firefighters reached the scene, flames had spread to the attached home. A firefighter tried to enter one end of the hangar but was stopped by thick smoke.

Two other firefighters managed to get several feet inside the building from the other end, where they spotted James Long's body, but they could do nothing because the intense heat quickly forced them out. Even so, they realized they were too late--Long already was charred beyond recognition.

Still reeling from the death of her father just 18 days earlier, Long sat in the yard numbly as the inferno engulfed their home as well. The roof of the corrugated steel hangar ultimately sagged nearly to the floor as the heat warped and buckled the steel frame.

By the time firefighters cut a hole in the side of the building to retrieve her husband's body, Long had been taken to a hospital and sedated because she was shaking so badly.

Eight days later--after her husband's funeral--Long was charged with murder.

According to Butts County law-enforcement officials, Long, then 53, had struck her husband on the head with a blunt object, then poured gasoline on him--twice--and set him ablaze. They said burn patterns and concrete cracked by intense heat were proof that gasoline had been poured over him and ignited.

The case would put Long, as well as the science underlying the charge, on trial.

Tasting for gasoline

For the first 80 years of the last century, knowledge about fire investigation evolved through trial and error and was passed on from veteran to neophyte as they picked through rubble and debris.

"Most of the fire investigation into the mid-1980s was taught by word of mouth by people who had been doing it for 20 years," said John DeHaan, a fire consultant in California who has been involved with fire and explosion investigations for more than 30 years. "There wasn't a lot of science in fire investigation. It was oral tradition."

In some instances, fire investigators confirmed their findings of arson by relying on confessions of suspects or using evidence of an accelerant to compel a confession.

Some of their methods were primitive. At one time, arson investigators tested for the presence of gasoline by actually tasting residue.

"The books said to eat a piece of white bread between tastes to clear the palate," said Patrick Kennedy, a private arson consultant formerly from Chicago and now based in Florida.

Kennedy's father, John A. Kennedy, wrote the industry's first textbook, "Fire and Arson Investigation," a red-covered tome of more than 1,000 pages that examined what was then called the "science" of fire investigation. The book, published in 1962, codified for the first time some of the theories of the day and became a guiding force for arson investigators in law enforcement and fire departments as well as in private industry, such as insurance companies.

After World War II, the elder Kennedy helped start the Mutual Investigation Bureau, an association of 50 fire insurers for which he investigated fires. In 1955, he set up his own firm in Chicago and went on to found the nation's first fire school at Purdue University.

Now retired, the elder Kennedy recalled how fire investigators worked back then. "I learned it by doing it," he said. "We--all arson investigators--were less than completely trained. Back then, when someone said it was arson--that was the final word."

Those theories now seem crude or have unraveled under closer scrutiny.

"Investigators were instructed to look at the way wood was charred and that would determine whether it was a fast fire or a slow fire," Kennedy's son, Patrick, said. "A fast one was caused by accelerants--an arson.

"There was no research that supported that. But we all believed that 30 years ago. I was teaching it."

"All these myths came about the same way," he continued. "There was no science training then. Guys like my dad--they were smart guys, but they went to a bunch of fires to see how badly charred things were and they would find gasoline and get a confession. And then, these anecdotal cases became a body of fact."

For example, the elder Kennedy said, there was little doubt 40 years ago that a fire fueled by an accelerant burned hotter than fires where no accelerant was involved.

"We have since found out that normal fires get just as hot without accelerants," the elder Kennedy said.

That belief became bedrock and launched other unproven theories.

For example, finding melted metal, such as an aluminum threshold or bedsprings, signaled a heat so intense that an accelerant must have been used. Finding "crazed glass"--glass riddled with an intricate spider web of cracks--was proof of rapid heating caused by an accelerant.

In 1977, the Law Enforcement Assistance Administration, part of the U.S. Justice Department, sought to collect arson expertise but relied primarily on a survey of fire investigators instead of trying to scientifically establish the accuracy of theories. The resulting book even noted that knowledge in the field had been subjected to "little or no scientific testing."

This publication, "Arson and Arson Investigation: Survey and Assessment," further

solidified many mistaken beliefs as truth, arson experts said.

After his father retired, Patrick Kennedy took over his company and moved it to Sarasota, Fla. Now, when he looks at the early texts written by his father, he readily concedes there were many mistakes--honest ones, he said.

His father agrees.

"Many of the things I propounded in the red book were absolutely wrong," the elder Kennedy said. "I admit it. But it was all we knew at the time."

Deadly fire dispels myths

In the fall of 1991, a brush fire broke out east of Oakland, Calif., and, pushed by powerful winds, ultimately destroyed more than 3,000 homes. One of the nation's worst wildfires at the time, property damage was estimated at $1.5 billion and more than two dozen people were killed.

Two weeks later, a group of private investigators converged on the scene because it presented a unique opportunity to study the residue of a fire that was not a product of arson.

Kicking through the rubble and devastation, the investigators made discoveries that were key developments in an emerging wave of self-examination that began to undermine some widely held arson theories.

Among the investigators was John Lentini, a private fire investigator with Applied Technical Services in Marietta, Ga. Lentini has investigated nearly 2,500 fires for prosecutors, judges and defense lawyers in a 30-year career that began at the Georgia state crime lab.

After inspecting 50 separate fire scenes in California, the team went back to laboratories and tried to duplicate its findings to check the validity of conclusions, Lentini said.

As a result, three long-standing arson "indicators"--melted bedsprings made of steel, melted copper and crazed glass--were disproved. Crazed glass, for example, can occur when glass, heated to more than 500 degrees, is sprayed with water, according to a report of their findings. In other words, the fighting of fires could have caused this phenomenon in cases that were labeled arsons.

Several months earlier, in March 1991, Lentini had played a key role in debunking another myth through a unique experiment after the indictment of Gerald Wayne Lewis for an October 1990 fire in Jacksonville, Fla., that killed his pregnant wife and four children.

Investigators for the Duval County sheriff's office said they found evidence that an accelerant had been used. As proof they pointed to burning under furniture and "pour patterns"--burn marks that supposedly occur when a flammable liquid is spread and ignited. The theory behind these patterns is that the fire burns hotter and faster where the liquid was because it was fueled by the accelerant.

Lewis said the fire started in a couch and got out of control so quickly that he barely escaped with his 3-year-old son.

In an attempt to figure out what happened, prosecutors spent $20,000 to hire experts, including Lentini, to start a fire in a similarly built condemned house next door to the Lewis home. The experiment became known widely in the arson investigation field as the "Lime Street fire" for the street where the house was on.

The fire was ignited in a couch without using accelerants, but the living room exploded in flames in less than five minutes anyway. When the fire was put out, authorities found streaks on the floor that resembled the "pour patterns" in the Lewis house that had been declared the product of arson.

This surprised investigators because the experiment showed that what appeared to be classic flammable liquid pour patterns could be the result of flashover--a naturally occurring phenomenon--and not just the result of an arson. Flashover occurs when smoke and gas in a room build to a point where the entire room explodes in flames, consuming everything within, including the floor.

But that wasn't all the experiment revealed.

For many years, fire investigators widely believed that because heat rises, evidence of burning on the floor, particularly under furniture--as was found in the Lewis house--indicated the fire was started on the floor with an accelerant. But the experiment provided strong evidence that a flashover fire caused the same damage.

Days after the experiment, the charges against Lewis were dropped.

The case "opened my eyes," Lentini said. "I was ready to send Lewis to the electric chair."

The Oakland blaze and the Lime Street fire provided unique opportunities for fire research. Much of the effort to refine and advance the science occurs at the federal Bureau of Alcohol, Tobacco, Firearms and Explosives fire science laboratory in Beltsville, Md., and the National Fire Academy in Emmitsburg, Md. Both facilities train fire investigators as well.

Private fire experts also provide training. Earlier this year, working with Nevada fire officials, DeHaan coordinated the burning of duplex homes scheduled for demolition at Fallon Naval Air Station in Nevada.

"We purchased identical sets of bedroom furniture and used matches to set the bedspreads on fire to simulate a scenario of children playing with matches as a training exercise," DeHaan said.

"In both cases, we found the room untenable--that is you would be overcome--within two to three minutes, and the entire room went up in five minutes," DeHaan said. "What we've discovered is that the fuels presented by modern upholstered furniture produce so much heat that they mimic the behavior of an accelerated fire. That's what we are teaching."

Part of this dawning of understanding was realizing the increasing presence of synthetic materials in home furniture, such as polyurethane foam and fiberfill in cushions, which burn rapidly and generate intense heat--far faster than wood, DeHaan said.

For instance, according to DeHaan, mattress manufacturers 30 years ago were required by law to make a product that was resistant to smoldering cigarettes. To do so, mattresses are made in part--some of them wholly--of urethane, which is resistant to a cigarette, but goes up quickly if exposed to an open flame, such as a candle.

Jack Malooley, a federal ATF agent in Chicago, teaches a fire investigation course at the Federal Law Enforcement Training Center in Georgia titled "Myths and Legends."

"I explain what the old-time theory was and how it was reached and how it's a falsehood and then take a break," he said.

"And guys will come up to me and say, `You're taking away everything we use. What's left?'" Malooley said. "Basically, the job they've chosen to do is far more difficult than they thought it was."

"Spalling of concrete is just one false theory," Malooley said, referring to a belief that concrete found to be chipped or flaked--"spalled"--after a fire is extinguished is evidence an accelerant was used, because the heat was so intense that moisture in the concrete expanded and exploded it.

"It's one of the myths that doesn't want to die," Malooley said. "But that's the problem with fire investigations. The old-timers don't keep up with the developments in the field."

The International Association of Arson Investigators, a group of about 9,000 fire investigators, asserted as recently as 1997 that fire investigation is not a science and therefore not subject to the rigorous requirements imposed on scientific disciplines in court, such as a need for verifiable results.

The association filed a legal brief in a Florida court case arguing a scientific standard did not apply because arson findings were based on the personal experience of investigators.

The following year, a federal appeals court rejected that argument. Since then, the association has come to embrace the idea that fire investigation properly done is based on science, said Alan Clark, association executive director.

"And that is a good thing--it has helped to eliminate a lot of stuff that was inaccurate," Clark said.

"When I started doing fire investigations, it was a lot easier. The longer I do it, the less I know. It used to be really simple--if you had a certain condition, it was automatic."

Setting new standards

Nearly 20 years ago, in an attempt to improve the quality of arson investigation, the National Fire Protection Association, an international group dedicated to fire safety, gathered a committee of experts from the private and public sectors to develop a guide for fire and explosion investigations.

The guide, first published in 1991 and titled "NFPA 921," went to considerable lengths to refute most of the field's unproven theories. It has been revised several times as scientific advances continue to emerge.

DeHaan, who was on the committee, said there was negative reaction to "NFPA 921."

"It basically is fear," he said. "This was something that could not be easily dismissed. There were many complaints from both the private and public sector. They didn't like hearing the s-word--science."

Robert Duval, senior fire investigator for the NFPA, believes that the guide as well as advances in technology will ultimately cure what he calls "a generational thing. ... The number of folks who don't want to let go of the old-fashioned way will be less and less."

Still, years after the first publication of "NFPA 921," some arson cases are still prosecuted based on outdated theories.

That's what happened to 27-year-old Eve Rudd, who was indicted by a Cuyahoga County, Ohio, grand jury for a fire in the early morning of June 10, 2001, that consumed her Cleveland duplex, killing her 4-year-old daughter and 6-year-old son.

Charged with arson and murder, Rudd was accused of setting the fire to get back at her husband because she suspected he was having an affair.

Authorities charged Rudd after finding pour patterns, which they said were evidence that she had doused clothing and papers in a second-floor bedroom with cooking oil and set the room ablaze.

But the pour patterns again proved to be a faulty indicator.

Kenneth Gibson, a fire investigator from Texas retained by defense lawyers, videotaped an experiment with cooking oil and found it was not an accelerant--in fact, the oil by itself was not flammable unless it was heated to 540 degrees.

Gerald Hurst, who also investigated the fire for the defense, said there were so many burn patterns, "you can't interpret them anymore."

Rudd was acquitted by a jury after spending nine months in jail.

Crazed glass and pour patterns were cited in the arson and murder indictment of Paul Camiolo for the September 1996 fire that destroyed his home and killed his parents in Montgomery County near Philadelphia.

Camiolo, 33, was standing outside when authorities arrived. Inside the home, authorities found his 81-year-old father dead of smoke inhalation. His 57-year-old mother died of fire injuries several weeks later.

In addition to the pour patterns and crazed glass, authorities said they found traces of gasoline in the wood floor under the carpet.

The state said it was seeking the death penalty when Camiolo was indicted on charges of arson and murder, as well as insurance fraud. Authorities said he set the fire to collect on a $400,000 inheritance.

Defense attorneys Thomas Cometa and William Ruzzo hired private fire experts, including Lentini and Richard Roby, of Columbia, Md., to examine the evidence. They noticed that the state experts also had found evidence of gasoline on the wood floor under the carpet in places that were not burned.

How, they wondered, could that be?

At Roby's urging, a private investigator tracked down the contractor who built the house. The contractor said the sealer used on the hardwood floors had been thinned with gasoline.

Lentini conducted lab tests that revealed the presence of lead in the gasoline. "We all knew that leaded gas had been banned in the mid-1980s and that it could not have been used to start this fire," he said.

As a result, the charges were dropped, but not before Camiolo had spent 10 months in jail awaiting trial.

[Click HERE to review *all* the reports in the Camiolo case, prosecution and defense.]

Hurst, a retired chemist who spent much of his career in the aerospace industry, bemoans the lack of sophistication in some fire investigations.

"We still have people doing the same damn thing guys did back in the 1980s, relying on cockamamie theories," he said.

`You know I didn't do it'

Four days after James Long was found dead in his rural Georgia workshop, Maj. Michael Overbey, chief investigator for the Butts County sheriff's office, brought his widow, Beverly Jean Long, in for questioning. Overbey confronted Long and accused her of helping someone else kill her husband and set him ablaze, according to a videotape of the interrogation later played in court.

Long repeatedly denied killing her husband and insisted the fire was an accident caused during the refueling of the smudge pot.

At one point, Overbey left Long alone in the interrogation room. He would later testify that he did so in the hope that she would talk to herself and say something

incriminating.

Instead, Long leaned over the table, put her head between her hands and made a desperate, mournful plea.

"Ohhhh, God, help me," she pleaded. "Help me have strength, God. You know I didn't do it."

But she wasn't believed and was arrested.

Released on bond, Long came to court a month later for a preliminary hearing. Using the testimony of Overbey, prosecutor Richard Milam outlined what appeared to be strong evidence to support the accusation that Long had clubbed her husband and set him ablaze.

Overbey said Long was found on his back with his arms partially raised above his head and his legs bent, "similar to that of a body that had been laid, placed, positioned, or even staged. It was not typical for a fire victim."

Overbey, who testified he had investigated as many as two dozen arson-homicides in his nearly 30 years in law enforcement, explained to Judge Thomas Wilson that if Long were the victim of only a fire, the body would have been found "in what they call a pugilistic attitude."

"It's upon this type of burn damage, the body goes back and assumes ... a fetal position," he said.

Further, Overbey said, fire officials discovered a fresh crack in the concrete floor directly under Long's body. "It's referred to as a spaulding crack," Overbey testified, mispronouncing the word "spalling."

"What is the cause of a spaulding crack such as this?" Milam asked.

"It's the [result of] generation of heat that's held underneath a body after it's been subjected to a flammable liquid and ignited," Overbey said. The crack under Long's body, he said, "has the characteristics of a spaulding pattern associated with an arson-homicide."

After Long's body was removed, investigators discovered an outline of his body on the floor, Overbey said. The outline was "a pattern that's typically associated with that of a flammable liquid ... what we refer to as pour patterns."

Milam asked Overbey how he interpreted the evidence.

"My opinion is that he was down on his back and someone poured him with a petroleum product at least twice," Overbey said. "They poured the area around him. ... We found pour patterns that were commonly found in arson-homicide."

Overbey said he determined a flammable liquid had been poured twice because "a body just doesn't burn that quick."

"A body that is not repeatedly doused will put itself out.... You know, the majority of us are made up of water and we self-extinguish."

[Click HERE for more excerpts from the transcript of Overbey's preliminary hearing testimony.]

Fire experts contradict Overbey's interpretation, noting that a severely burned body by itself is not evidence that an accelerant was used.

Overbey testified at the preliminary hearing that a Georgia state fire marshal investigator and a Butts County arson investigator "concurred with our investigation."

The medical examiner had performed an autopsy that showed some small fractures in the victim's skull, Overbey said at the hearing. The workshop, he noted, contained many items that could have been used to strike a blow sufficient to fracture the skull.

In May, more than a year after that hearing, Long came to trial in the Butts County courthouse in Jackson. She watched as her husband's first wife and two of her stepchildren testified that Long had not seemed at all upset about losing her husband or their home. She had not wept after the fire, they told the jury.

Overbey testified that he believed Long's emotional statements on the 911 call and in the interrogation were an act and that she was faking her grief.

As part of Long's defense, her attorneys, Wade Crumbley and Barbara Moon, called Lentini to the witness stand.

The lawyers had asked Lentini to review the evidence after the preliminary hearing and he not only came to a different conclusion, but also agreed to handle the case for free.

"I decided I was not willing to let this woman go to prison because she couldn't afford to pay me," he testified. "This fire was a terrible accident."

He told the jury that he analyzed results of tests performed on the smudge pot at the request of the Longs' insurance company, not the prosecution.

The tests, he said, revealed the presence of gasoline residue. The exhaust stack, Lentini said, was lined with soot and charcoal flakes that would remain hot even after the smudge pot was extinguished and would ignite vapors from gasoline being poured in to refuel it.

"Anytime you put gasoline into something designed to burn kerosene, you're asking for trouble," he testified. "You would be lucky to get away from it without getting hurt."

The pugilistic position, Lentini also testified, is not the fetal position, but is instead exactly how Long's body was found.

"Spaulding" is an incorrect term, he said, for "spalling," the flaking of concrete--not

a crack as described by Overbey. "If they say spaulding," Lentini said, "It is a clue that they don't know what they are talking about."

Further, he testified that even if Overbey had used the correct terminology, spalling is not an automatic indicator of arson.

There were no pour patterns, Lentini said. The patterns that Overbey cited were actually the result of "heat-shielding," a phenomenon caused by such items as clothing, tools or even a body.

Overbey, Lentini told the jury, "didn't have a clue ... and what you're left with is a lack of evidence--which proves nothing."

The jury agreed.

On June 3, after eight days of trial, Long was acquitted.

In a recent interview, Overbey said he still believes Long poured gasoline over her husband and set him afire. He said Lentini was "one-sided ... a person paid to come and voice [the defense] point of view. ... I think he was wrong with his conclusion."

But, Overbey added, "I never contended to be an expert on arson."

Arson **Junk Science**